

The invention claimed is:

1. A portable wind powered generator tower for supporting a wind powered generator comprising:

a lower tower section including a first vertical column, a second vertical column and a third vertical column, the lower tower further including at least three cross braces, with two of the cross braces being connected to each of the first vertical column, the second vertical column and the third vertical column; and

an upper tower section including a first upper column, a second upper column and a third upper column, with the first upper column and the second upper column being substantially parallel and the third upper column converging towards the first upper column and the second upper column; and

an elevator configured to be connected to a wind powered generator to raise and lower the wind powered generator from the lower tower section to the upper tower section;

wherein the lower tower section is configured to be connected to the upper tower section by connecting a top of the first vertical column of the lower tower section directly below the upper tower section to a bottom of the first upper column of the upper tower section, connecting a top of the second vertical column of the lower tower section directly below the upper tower section to a bottom of the second upper column of the upper tower section, and connecting a top of the third vertical column of the lower tower section directly below the upper tower section to a bottom of the third upper column of the upper tower section; and

wherein the elevator is fully assembled and ready to raise and lower the wind powered generator when the lower tower section is connected to the upper tower section.

2. The portable wind powered generator tower of claim 1, wherein:

the elevator includes a vertical track and a carriage; and

the carriage is configured to move along the vertical track to raise and lower the wind powered generator.

3. The portable wind powered generator tower of claim 2, wherein:

the vertical track includes a first side guide having a first vertical strip and a second side guide having a second vertical strip; and

the carriage includes a first side groove configured to accept the first vertical strip and a second side groove configured to accept the second vertical strip, thereby allowing the carriage to slide along the first vertical strip and the second vertical strip of the vertical track.

4. The portable wind powered generator tower of claim 3, wherein:

the first vertical strip is comprised of a plurality of first vertical strip portions;

the second vertical strip is comprised of a plurality of second vertical strip portions;

the first vertical column of the lower tower section includes one of the first vertical strip portions;

the first upper column includes one of the first vertical strip portions;

the second vertical column of the one lower tower section includes one of the second vertical strip portions;

the second upper column includes one of the second vertical strip portions; and

the first vertical strip and the second vertical strip are fully assembled when the at least one lower tower section is connected to the upper tower section.

5. The portable wind powered generator tower of claim 2, further including:

a carriage raising assembly including a winch, a cable and a pulley;

wherein the pulley is connected to the upper tower section and the winch is connected to the lower tower section; and

wherein the cable is connected to the winch and the carriage, the cable further being wrapped about the pulley whereby the carriage can be raised by rotating the winch to thereby pull the cable about the pulley and raise the carriage.

6. The portable wind powered generator tower of claim 2, wherein:

the carriage includes a pivot ring adapted to allow the wind powered generator to pivot about the carriage when the wind powered generator is located at a top of the upper tower section.

7. The portable wind powered generator tower of claim 6, wherein:
the pivot ring includes a plurality of roller bearings configured to accept a portion of the wind powered generator thereon, thereby allowing the wind powered generator to rotate.
8. The portable wind powered generator tower of claim 2, wherein:
the carriage includes a plurality of contacts configured to contact a rotating portion of a wind powered generator to allow power to be transferred from the wind powered generator to a remote point.
9. A wind powered generator support assembly for supporting a wind powered generator comprising:
a tower; and
a vertical elevator on the tower, the elevator including a track and a carriage configured to move along the track, the carriage including a pivot ring configured to accept the wind powered generator for allowing the wind powered generator to rotate about the carriage;
wherein the vertical elevator is configured to vertically lift the wind powered generator with the carriage to position the wind powered generator at a top of the tower.
10. The wind powered generator support assembly of claim 9, wherein:
the track includes a first side guide having a first vertical strip and a second side guide having a second vertical strip; and
the carriage includes a first side groove configured to accept the first vertical strip and a second side groove configured to accept the second vertical strip, thereby allowing the carriage to slide along the first vertical strip and the second vertical strip of the track.
11. The wind powered generator support assembly of claim 9, wherein:
the tower comprises a lower tower section and an upper tower section;
the lower tower section includes a first vertical column, a second vertical column and a third vertical column, the lower tower further including at least three cross braces, with two of the cross braces being connected to each of the first vertical columns, the second vertical column and the third vertical column; and

the upper tower section including a first upper column, a second upper column and a third upper column, with the first upper column and the second upper column being substantially parallel and the third upper column converging towards the first upper column and the second upper column;

the lower tower section is configured to be connected to the upper tower section by connecting a top of the first vertical column of the lower tower section directly below the upper tower section to a bottom of the first upper column of the upper tower section, connecting a top of the second vertical column of the lower tower section directly below the upper tower section to a bottom of the second upper column of the upper tower section, and connecting a top of the third vertical column of the lower tower section directly below the upper tower section to a bottom of the third upper column of the upper tower section; and

the track is fully assembled and ready to raise and lower the wind powered generator when the lower tower section is connected to the upper tower section.

12. The wind powered generator support assembly of claim 11, wherein:

the vertical track includes a first side guide having a first vertical strip and a second side guide having a second vertical strip; and

the carriage includes a first side groove configured to accept the first vertical strip and a second side groove configured to accept the second vertical strip, thereby allowing the carriage to slide along the first vertical strip and the second vertical strip of the vertical track.

13. The wind powered generator support assembly of claim 12, wherein:

the first vertical strip is comprised of a plurality of first vertical strip portions;

the second vertical strip is comprised of a plurality of second vertical strip portions;

the first vertical column of the lower tower section includes one of the first vertical strips;

the first upper column includes one of the first vertical strips;

the second vertical column of the one lower tower section includes one of the second vertical strips;

the second upper column includes one of the second vertical strips; and

the first vertical strip and the second vertical strip are fully assembled when the at least one lower tower section is connected to the upper tower section.

14. The wind powered generator support assembly of claim 13, further including:
a carriage raising assembly including a winch, a cable and a pulley;
wherein the pulley is connected to the upper tower section of the tower and the winch is connected to the lower tower section; and

wherein the cable is connected to the winch and the carriage, the cable further being wrapped about the pulley whereby the carriage can be raised by rotating the winch to thereby pull the cable about the pulley and raise the carriage.

15. The wind powered generator support assembly of claim 9, wherein:
the pivot ring includes a plurality of roller bearings configured to accept a portion of the wind powered generator thereon, thereby allowing the wind powered generator to rotate.

16. The wind powered generator support assembly of claim 9, wherein:
the carriage includes a plurality of contacts configured to contact a rotating portion of a wind powered generator to allow power to be transferred from the wind powered generator to a remote point.

17. The wind powered generator support assembly of claim 9, further including:
a carriage raising assembly including a winch, a cable and a pulley;
wherein the pulley is connected to an upper portion of the tower and the winch is connected to a lower portion of the tower; and
wherein the cable is connected to the winch and the carriage, the cable further being wrapped about the pulley whereby the carriage can be raised by rotating the winch to thereby pull the cable about the pulley and raise the carriage.

18. A wind powered electrical generation system comprising:
a tower including a vertical elevator, the vertical elevator having a track and a carriage configured to move along the track;

a wind powered generator configured to be connected to the carriage, the wind powered generator including a plurality of airfoils and an electric generator;

wherein the wind powered generator can be placed within the carriage after the tower has been erected and lifted vertically with the carriage to position the wind powered generator at a top of the tower.

19. The wind powered electrical generation system of claim 18, wherein:

the track includes a first side guide having a first vertical strip and a second side guide having a second vertical strip; and

the carriage includes a first side groove configured to accept the first vertical strip and a second side groove configured to accept the second vertical strip, thereby allowing the carriage to slide along the first vertical strip and the second vertical strip of the track.

20. The wind powered electrical generation system of claim 18, wherein:

the tower comprises a lower tower section and an upper tower section;

the lower tower section including a first vertical column, a second vertical column and a third vertical column, the lower tower further including at least three cross braces, with two of the cross braces being connected to each of the first vertical column, the second vertical column and the third vertical column; and

the upper tower section including a first upper column, a second upper column and a third upper column, with the first upper column and the second upper column being substantially parallel and the third upper column converging towards the first upper column and the second upper column;

the lower tower section is configured to be connected to the upper tower section by connecting a top of the first vertical column of the lower tower section directly below the upper tower section to a bottom of the first upper column of the upper tower section, connecting a top of the second vertical column of the lower tower section directly below the upper tower section to a bottom of the second upper column of the upper tower section, and connecting a top of the third vertical column of the lower tower section directly below the upper tower section to a bottom of the third upper column of the upper tower section; and

the track is fully assembled and ready to raise and lower the wind powered generator when the lower tower section is connected to the upper tower section.

21. The wind powered electrical generation system of claim 20, wherein:

the vertical track includes a first side guide having a first vertical strip and a second side guide having a second vertical strip; and

the carriage includes a first side groove configured to accept the first vertical strip and a second side groove configured to accept the second vertical strip, thereby allowing the carriage to slide along the first vertical strip and the second vertical strip of the vertical track.

22. The wind powered electrical generation system of claim 21, wherein:

the first vertical strip is comprised of a plurality of first vertical strip portions;

the second vertical strip is comprised of a plurality of second vertical strip portions;

the first vertical column of the lower tower section includes one of the first vertical strips;

the first upper column includes one of the first vertical strips;

the second vertical column of the one lower tower section includes one of the second vertical strips;

the second upper column includes one of the second vertical strips; and

the first vertical strip and the second vertical strip are fully assembled when the at least one lower tower section is connected to the upper tower section.

23. The wind powered electrical generation system of claim 22, further including:

a carriage raising assembly including a winch, a cable and a pulley;

wherein the pulley is connected to the upper tower section and the winch is connected to the lower tower section; and

wherein the cable is connected to the winch and the carriage, the cable further being wrapped about the pulley whereby the carriage can be raised by rotating the winch to thereby pull the cable about the pulley and raise the carriage.

24. The wind powered electrical generation system of claim 18, wherein:
the pivot ring includes a plurality of roller bearings configured to accept a portion of the wind powered generator thereon, thereby allowing the wind powered generator to rotate.
25. The wind powered electrical generation system of claim 18, wherein:
the carriage includes a plurality of contacts configured to contact a rotating portion of the wind powered generator to allow power to be transferred from the wind powered generator to a remote point.
26. The wind powered electrical generation system of claim 18, further including:
a carriage raising assembly including a winch, a cable and a pulley;
wherein the pulley is connected to an upper portion of the tower and the winch is connected to a lower portion of the tower; and
wherein the cable is connected to the winch and the carriage, the cable further being wrapped about the pulley whereby the carriage can be raised by rotating the winch to thereby pull the cable about the pulley and raise the carriage.
27. The wind powered electrical generation system of claim 18, wherein:
the wind powered generator further includes:
a housing;
a rod configured to rotate within the housing; and
at least two spars connected to the rod and extending radially therefrom;
wherein one of the airfoils is connected to each of the spars.
28. The wind powered electrical generation system of claim 27, wherein:
the airfoils are configured to pivot about the spars and to slide longitudinally along the spars;
the airfoils are biased towards a first end of the spars connected to the hub;
each spar includes a cam member adjacent a second end of the spar opposite to the hub;
each airfoil includes a cam surface configured to engage the cam member on the spar;

the cam member and the cam surface are configured to engage to thereby rotate the airfoils relative to the spars as the airfoils move along the spars towards the second end of the spars.

29. The wind powered electrical generation system of claim 18, wherein:
the airfoil and generator assembly includes a vertical leg;
the vertical leg is configured to be placed within the carriage and rotate relative to the carriage when the airfoil and generator assembly is placed within the carriage.
30. The wind powered electrical generation system of claim 29, wherein:
the airfoil and generator assembly further includes a horizontal leg including a first shaft and a second shaft, the first shaft being rotatable within the second shaft;
the second shaft of the horizontal leg is connected to an end of the vertical leg;
the airfoils are interconnected to the first shaft; and
the generator is connected to the second shaft.
31. The wind powered electrical generation system of claim 30, wherein:
the second shaft of the horizontal leg is connected to an end of the first rod of the vertical leg at a position off center from an axis of the vertical leg.
32. The wind powered electrical generation system of claim 31, wherein:
the first shaft includes a hub fixed to an end thereof; and
spars are connected to the hub, the spars extending from the hub in a position substantially perpendicular to the first shaft.
33. The wind powered electrical generation system of claim 32, wherein:
the airfoils are configured to pivot about the spars and to slide longitudinally along the spars;
the airfoils are biased towards a first end of the spars connected to the hub;
each spar includes a cam member adjacent a second end of the spar opposite to the hub;
each airfoil includes a cam surface configured to engage the cam member on the spar;

the cam member and the cam surface are configured to engage to thereby rotate the airfoils relative to the spars as the airfoils move along the spars towards the second end of the spars.

34. A wind powered generator comprising:
- a housing;
 - a rod configured to rotate within the housing;
 - at least two spars connected to the rod and extending radially therefrom;
 - an airfoil connected to each of the spars at a location distal the rod;
 - the airfoils being configured to pivot about the spars and to slide longitudinally along the spars;
 - the airfoils being biased towards a first end of the spars connected to the hub;
 - each spar including a cam member adjacent a second end of the spar opposite to the hub; and
 - each airfoil including a cam surface configured to engage the cam member on the spar;
 - wherein the cam member and the cam surface are configured to engage to thereby rotate the airfoils relative to the spars as the airfoils move along the spars towards the second end of the spars.

35. The wind powered generator of claim 34, further including:
- an electrical generator connected to the housing.

36. The wind powered generator of claim 35, further including:
- a vertical leg connected to the housing;
 - wherein the housing is connected to an end of the vertical leg at a position off center from an axis of the vertical leg.

37. The wind powered generator of claim 34, wherein:
- the rod includes a hub fixed to an end thereof; and
 - the spars are connected to the hub, with the spars extending from the hub in a position substantially perpendicular to the rod.

38. The wind powered generator of claim 34, wherein:
the at least two spars includes at six spars; and
further including an electrical generator located downwind from the airfoils.
39. A wind powered generator comprising:
a housing;
a rod configured to rotate within the housing;
at least six spars connected to the rod and extending radially therefrom;
an airfoil connected to each of the spars at a location distal the rod; and
a generator located upwind of the spars and interconnected to the rod;
wherein the spars and the rod will rotate as wind passes the airfoils, thereby powering the generator.
40. The wind powered generator of claim 39, wherein:
the airfoils are configured to pivot about the spars and to slide longitudinally along the spars;
the airfoils are biased towards a first end of the spars connected to the hub;
each spar includes a cam member adjacent a second end of the spar opposite to the hub;
each airfoil includes a cam surface configured to engage the cam member on the spar;
and
the cam member and the cam surface are configured to engage to thereby rotate the airfoils relative to the spars as the airfoils move along the spars towards the second end of the spars.
41. The wind powered generator of claim 39, further including:
an electrical generator connected to the housing.
42. The wind powered generator of claim 39, further including:
a vertical leg connected to the housing;
wherein the housing is connected to an end of the vertical leg at a position off center from an axis of the vertical leg.

43. The wind powered generator of claim 39, wherein:
the rod includes a hub fixed to an end thereof; and
the spars are connected to the hub, with the spars extending from the hub in a position substantially perpendicular to the rod.

44. A wind powered electrical generation system comprising:
a tower including an elevator having a carriage, the elevator being configured to move the carriage between a bottom and a top of the tower;
a first member rotatably connected to the carriage, the first member having an axis of rotation substantially parallel to the direction of movement of the carriage;
a second member connected to the first member, the second member having a first end and a second end;
a hub assembly connected to the first end of the second member, the hub assembly including a plurality of spars;
an airfoil connected to each spar; and
a generator connected to the second end of the second member;
wherein the spars and the second member will rotate as wind passes the airfoils, thereby powering the generator.

45. The wind powered electrical generation system of claim 44, wherein:
the elevator includes a track, the track including a first side guide having a first vertical strip and a second side guide having a second vertical strip; and
the carriage includes a first side groove configured to accept the first vertical strip and a second side groove configured to accept the second vertical strip, thereby allowing the carriage to slide along the first vertical strip and the second vertical strip of the track to move between the top and bottom of the tower.

46. The wind powered electrical generation system of claim 44, wherein:
the tower comprises a lower tower section and an upper tower section;
the lower tower section including a first vertical column, a second vertical column and a third vertical column, the lower tower further including at least three cross braces, with two

of the cross braces being connected to each of the first vertical column, the second vertical column and the third vertical column; and

the upper tower section including a first upper column, a second upper column and a third upper column, with the first upper column and the second upper column being substantially parallel and the third upper column converging towards the first upper column and the second upper column;

the lower tower section is configured to be connected to the upper tower section by connecting a top of the first vertical column of the lower tower section directly below the upper tower section to a bottom of the first upper column of the upper tower section, connecting a top of the second vertical column of the lower tower section directly below the upper tower section to a bottom of the second upper column of the upper tower section, and connecting a top of the third vertical column of the lower tower section directly below the upper tower section to a bottom of the third upper column of the upper tower section;

the elevator includes a track upon which the carriage moves; and

the track is fully assembled and ready to raise and lower the wind powered generator when the lower tower section is connected to the upper tower section.

47. The wind powered electrical generation system of claim 46, wherein:

the track includes a first side guide having a first vertical strip and a second side guide having a second vertical strip; and

the carriage includes a first side groove configured to accept the first vertical strip and a second side groove configured to accept the second vertical strip, thereby allowing the carriage to slide along the first vertical strip and the second vertical strip of the track.

48. The wind powered electrical generation system of claim 47, wherein:

the first vertical strip is comprised of a plurality of first vertical strip portions;

the second vertical strip is comprised of a plurality of second vertical strip portions;

the first vertical column of the lower tower section includes one of the first vertical strips;

the first upper column includes one of the first vertical strips;

the second vertical column of the one lower tower section includes one of the second vertical strips;

the second upper column includes one of the second vertical strips; and

the first vertical strip and the second vertical strip are fully assembled when the at least one lower tower section is connected to the upper tower section.

49. The wind powered electrical generation system of claim 48, further including:
a carriage raising assembly including a winch, a cable and a pulley;
wherein the pulley is connected to the upper tower section and the winch is connected to the lower tower section; and
wherein the cable is connected to the winch and the carriage, the cable further being wrapped about the pulley whereby the carriage can be raised by rotating the winch to thereby pull the cable about the pulley and raise the carriage.

50. The wind powered electrical generation system of claim 44, wherein:
the carriage includes a pivot ring having a plurality of roller bearings configured to accept the first member thereon, thereby allowing the first member to rotate.

51. The wind powered electrical generation system of claim 44, wherein:
the carriage includes a plurality of contacts configured to contact a rotating portion of the first member to allow power to be transferred from the first member to a remote point.

52. The wind powered electrical generation system of claim 44, further including:
a carriage raising assembly including a winch, a cable and a pulley;
wherein the pulley is connected to an upper portion of the tower and the winch is connected to a lower portion of the tower; and
wherein the cable is connected to the winch and the carriage, the cable further being wrapped about the pulley whereby the carriage can be raised by rotating the winch to thereby pull the cable about the pulley and raise the carriage.

53. The wind powered electrical generation system of claim 44, wherein:
the airfoils are configured to pivot about the spars and to slide longitudinally along the spars;
the airfoils are biased towards a first end of the spars connected to the hub;
each spar includes a cam member adjacent a second end of the spar opposite to the hub;
each airfoil includes a cam surface configured to engage the cam member on the spar;
the cam member and the cam surface are configured to engage to thereby rotate the airfoils relative to the spars as the airfoils move along the spars towards the second end of the spars.

54. The wind powered electrical generation system of claim 44, wherein:
the second member is connected to an end of the first member at a position off center from an axis of the first member.

55. The wind powered electrical generation system of claim 44, wherein:
the spars extend from the hub in a position substantially perpendicular to the second member.

56. The wind powered electrical generation system of claim 44, wherein:
the airfoils are configured to pivot about the spars and to slide longitudinally along the spars;
the airfoils are biased towards a first end of the spars connected to the hub;
each spar includes a cam member adjacent a second end of the spar opposite to the hub;
each airfoil includes a cam surface configured to engage the cam member on the spar;
the cam member and the cam surface are configured to engage to thereby rotate the airfoils relative to the spars as the airfoils move along the spars towards the second end of the spars.

57. A portable wind powered generation system comprising:
a tower having an upper tower section and a lower tower section, the upper tower section and the lower tower section being removably connected;

a wind powered generator; and

an elevator connected to the tower, the elevator being able to move between the lower tower section and the upper tower section of the tower;

wherein the wind powered generator is configured to be connected to the elevator to raise the wind powered generator from the lower tower section to the upper tower section; and

wherein the wind powered generator can be unconnected from the elevator and the upper tower section can be unconnected from the lower tower section, thereby allowing the portable wind powered generator assembly to be easily transported and erected.

58. The wind powered electrical generation system of claim 57, wherein:

the lower tower section including a first vertical column, a second vertical column and a third vertical column, the lower tower further including at least three cross braces, with two of the cross braces being connected to each of the first vertical column, the second vertical column and the third vertical column; and

the upper tower section including a first upper column, a second upper column and a third upper column, with the first upper column and the second upper column being substantially parallel and the third upper column converging towards the first upper column and the second upper column;

the lower tower section is configured to be connected to the upper tower section by connecting a top of the first vertical column of the lower tower section directly below the upper tower section to a bottom of the first upper column of the upper tower section, connecting a top of the second vertical column of the lower tower section directly below the upper tower section to a bottom of the second upper column of the upper tower section, and connecting a top of the third vertical column of the lower tower section directly below the upper tower section to a bottom of the third upper column of the upper tower section;

the elevator includes a carriage and a track upon which the carriage moves; and

the track is fully assembled and ready to raise and lower the wind powered generator when the one lower tower section is connected to the upper tower section.

59. The wind powered electrical generation system of claim 58, wherein:

the vertical track includes a first side guide having a first vertical strip and a second side guide having a second vertical strip; and

the carriage includes a first side groove configured to accept the first vertical strip and a second side groove configured to accept the second vertical strip, thereby allowing the carriage to slide along the first vertical strip and the second vertical strip of the vertical track.

60. The wind powered electrical generation system of claim 59, wherein:

the first vertical strip is comprised of a plurality of first vertical strip portions;

the second vertical strip is comprised of a plurality of second vertical strip portions;

the first vertical column of the lower tower section includes one of the first vertical strips;

the first upper column includes one of the first vertical strips;

the second vertical column of the one lower tower section includes one of the second vertical strips;

the second upper column includes one of the second vertical strips; and

the first vertical strip and the second vertical strip are fully assembled when the at least one lower tower section is connected to the upper tower section.

61. The wind powered electrical generation system of claim 60, further including:

a carriage raising assembly including a winch, a cable and a pulley;

wherein the pulley is connected to the upper tower section and the winch is connected to the lower tower section; and

wherein the cable is connected to the winch and the carriage, the cable further being wrapped about the pulley whereby the carriage can be raised by rotating the winch to thereby pull the cable about the pulley and raise the carriage.

62. The wind powered electrical generation system of claim 61, wherein:

the carriage includes a pivot ring having a plurality of roller bearings configured to accept a portion of the wind powered generator thereon, thereby allowing the wind powered generator to rotate.

63. The wind powered electrical generation system of claim 62, wherein:
the carriage includes a plurality of contacts configured to contact a rotating portion of the wind powered generator to allow power to be transferred from the wind powered generator to a remote point.
64. The wind powered electrical generation system of claim 63, wherein:
the wind powered generator includes:
a housing;
a rod configured to rotate within the housing;
at least two spars connected to the rod and extending radially therefrom; and
the airfoils are connected to each of the spars.
65. The wind powered electrical generation system of claim 64, wherein:
the airfoils are configured to pivot about the spars and to slide longitudinally along the spars;
the airfoils are biased towards a first end of the spars connected to the hub;
each spar includes a cam member adjacent a second end of the spar opposite to the hub;
each airfoil includes a cam surface configured to engage the cam member on the spar;
the cam member and the cam surface are configured to engage to thereby rotate the airfoils relative to the spars as the airfoils move along the spars towards the second end of the spars.
66. The wind powered electrical generation system of claim 65, wherein:
the wind powered generator further includes a vertical leg;
the vertical leg is configured to be placed within the carriage and rotate relative to the carriage when the wind powered generator assembly is placed within the carriage.
67. The wind powered electrical generation system of claim 66, wherein:
the wind powered generator further includes a horizontal leg including a first shaft and a second shaft, the first shaft being rotatable within the second shaft;
the second shaft of the horizontal leg is connected to an end of the vertical leg;

the airfoils are interconnected to the first shaft; and
the generator is connected to the second shaft.

68. The wind powered electrical generation system of claim 67, wherein:
the second shaft of the horizontal leg is connected to an end of the first rod of the
vertical leg at a position off center from an axis of the vertical leg.

69. The wind powered electrical generation system of claim 68, wherein:
the first shaft includes a hub fixed to an end thereof; and
spars are connected to the hub, the spars extending from the hub in a position
substantially perpendicular to the first shaft.

70. The wind powered electrical generation system of claim 69, wherein:
the airfoils are configured to pivot about the spars and to slide longitudinally along the
spars;
the airfoils are biased towards a first end of the spars connected to the hub;
each spar includes a cam member adjacent a second end of the spar opposite to the hub;
each airfoil includes a cam surface configured to engage the cam member on the spar;
the cam member and the cam surface are configured to engage to thereby rotate the
airfoils relative to the spars as the airfoils move along the spars towards the second end of the
spars.